Chitosan is a biomaterial derived from the deacetylation of chitin, a polysaccharide found in the exoskeleton of the shells of shrimp, crab and other arthropods.

Chitosan, useful for the practice of the instant invention described herein, is available from Aldrich Chemical (Aldrich Chemical Company Inc, 1001 W. Saint Paul Avenue, Milwaukee WI 53233-2641, USA).

Chitosan's high affinity for metals adsorption is well documented in the literature. However, if chitosan is used in a flow column in its natural flake form, gelling and associated hydrodynamic flow problems arise due to the fact that the metal binding sites of the chitosan are not fully exposed for adsorption in its flake form. In order to overcome these problems, it has now been discovered that chitosan is coated on to a support material. It has further been discovered that support material facilitates column flow conditions and enhances mass transfer characteristics of the chitosan.

Support materials useful for the practice of the instant invention are appropriately selected so that the support material accepts and retains the chitosan gel of the instant invention for a sufficient time.

One embodiment of this invention comprises ceramic support materials coated with chitosan. Nonlimiting examples of ceramic support materials useful herein include alumina and silica (available from Aldrich Chemical Company, Inc., 1001 W. Saint Paul Avenue, Milwaukee, WI 53233-2641, USA and Sumitomo Chemical America, Inc., One California Street, Suit 2300, San Francisco, CA 94111, USA).

A preferred support material is ultra fine ceramic alumina. Such useful ceramic alumina is available from Aldrich Chemical Company. Ultrafine ceramic alumina means having the property of particle size in the range of from about 10 μ to about 150 μ.

The process for coating chitosan on to a support material of this invention comprises producing a chitosan gel, producing a support material, and coating the chitosan on to the support material. Processes such as dip coating and spin coating are useful for coating the chitosan gel on to the support material.

The process of dip coating may comprise the steps of preparing a ceramic substrate, preparing a chitosan gel, surface coating the ceramic substrate with chitosan, filtering the coated biosorbent and coating a second surface coating of chitosan on the ceramic substrate.

A substrate to be utilized for dip coating can be prepared by drying a selected substrate (such as a ceramic substrate) in an oven and then storing the dried substrate in a desiccator. This substrate then can then be mixed with an acid. After acid treatment the substrate should be washed and dried again.

A chitosan gel to be utilized for dip coating can be prepared by adding about 3 to 10 grams of medium molecular weight chitosan to 100 ml of 10 wt% acid under constant stirring and heat addition to form a viscous mixture.

The now prepared chitosan gel can then be coated on to the acid treated and dried substrate by diluting the chitosan gel with water under heat. The acid treated substrate can then be added to the diluted gel and stirred for about 36 hours.

After stirring, the contents are allowed to settle, and any clear liquid produced is filtered out under vacuum. The filtered material (chitosan biosorbent) should be washed with deionized water and dried in an oven at 55°C under vacuum for 24 hours. The dried chitosan biosorbent can then be stored for a second coat of chitosan.

A second coating of chitosan can be applied by treating the once coated substrate again with chitosan-acid gel under constant stirring conditions for approximately 24